The Mars Technology Program (MTP) exists within the MEP to develop technologies needed for future Mars missions, including Mars Scouts. The Mars Technology Program consists of two principal elements: the Focused Technology and Base Technology Programs.

The Focused Technology Program addresses technologies that are specific to near-term missions. Currently, the emphasis is on the technologies required to implement the Mobile Science Laboratory (MSL) mission in 2009. The critical technologies for this mission are: Entry, Descent, and Landing (EDL), Long-Life, Go-To capability for a rover, Sample Acquisition, Handling and Processing, and Mars Proximity Telecom. A short summary of these technology areas follows:

- EDL technology will provide precision landing (~10km landing error) and safe landing (landing on slopes of less than 30 deg with smaller than 1 meter rocks). This is achieved by developing technologies in optical navigation, guided entry, subsonic parachutes, descent propulsion, hazard detection and avoidance, and robust landing.
- Long-life capability is addressed by two technologies: surface power and survivability of hardware on the surface of Mars. Surface power will be provided by radioisotope power sources. The supporting technology for this capability will be jointly developed by the Focused Technology Program and the Nuclear Systems Initiative. Survivability technologies will address both the electronic and mechanical elements of MSL.

- The Go-To rover technology will provide autonomous long traverse capability (10+ km), thus enabling the rover to reach virtually any science target designated using high-resolution orbital imagery obtained from previous Mars missions. In addition, technologies for autonomous instrument placement will be developed to reduce ground control interactions, which slow the pace of in situ experiments.

- Sample acquisition, handling, and processing includes technologies that enable the extraction of samples from the environment, the transfer of those samples to a sample processing unit, and processing of the samples for delivery to the on-board science instruments.

- The Mars Proximity Telecom System (The Electra Payload) will develop a radiation tolerant/hardened, reconfigurable wireless network node to enable enhanced telecom and navigation capability for all future Mars missions. This payload will be flown on the Mars Reconnaissance Orbiter (MRO) mission to validate the technology before it is used on MSL.

The Base Technology Program addresses those technologies that are applicable for mid- and far-term mission (i.e. missions starting more than five years from now) and that are applicable to multiple missions. Base technologies also address longer term, higher risk, high payoff technologies that may enable new types of missions. These include:

- Regional Mobility and Subsurface Access includes innovations in autonomous surface vehicles (rovers), aerial platforms such as balloons and airplanes, subsurface access with drills and other robotic devices, and science operations.

- Science Instruments and Systems include the development of both remote and in situ instrumentation for addressing scientific objectives, with a focus on the development of new techniques for in situ life detection.

- Telecom and Navigation technology investments are focused on Mars-specific needs related to proximity link relay communications and in situ radio-based navigation scenarios. Relay communications technologies are aimed at significantly increasing science data return from a wide range of future exploration assets (e.g., landers, rovers, aerobots, microprobes) while minimizing mass, volume, and energy needs. Next-generation network protocols will ensure interoperability while enabling efficient operations. Extraction of radiometric information from these proximity links will also support precision in situ navigation for scenarios such as approach, surface mobility, and on-orbit rendezvous.

- Advanced Entry Descent and Landing focuses on third generation capabilities in entry, descent, and landing, and provides pinpoint accuracy through advances in navigation, guidance, and sensors.

- Mars Sample Return Technologies – includes innovative technologies that may provide new capabilities to enable Mars Sample Return missions while substantially reduce the cost. This includes new technologies that can enhance the performance of the Mars Ascent Vehicle (MAV) by reducing power, mass, and volume, and increasing accuracy with which samples are injected into Mars orbit. Other technologies include innovative techniques to satisfy the forward and back planetary protection requirements by less expensive methods than currently available. This technology area will also address the development of technologies for the Mars Orbit Sample Rendezvous and Capture.

- Scout Mission Technologies includes those technologies that will enable future (post 2007) Scout missions. The approach is to solicit ideas from the Scout community for technologies that are deemed enabling for a wide variety of future Scout missions. The Mars Technology

Program will competitively select those technologies that will have the highest payoff for future Scout missions. Technologies developed under this program will be available to the community and may benefit future Scout and baseline missions.